

Cooperative Research Agreements to Improve NRC Safety Codes

Code Applications and Maintenance Program (CAMP)

What is CAMP?

- International program on reactor and plant systems accident analysis and assessments, research, and code development activities
- NRC coordinated program with participation from 30+ countries
- Recognize a need to equitably share both the resources resulting from this research and the effort required to develop those resources
- NRC hosts biannual meetings (in May and November) to review progress and to report code development and assessment status

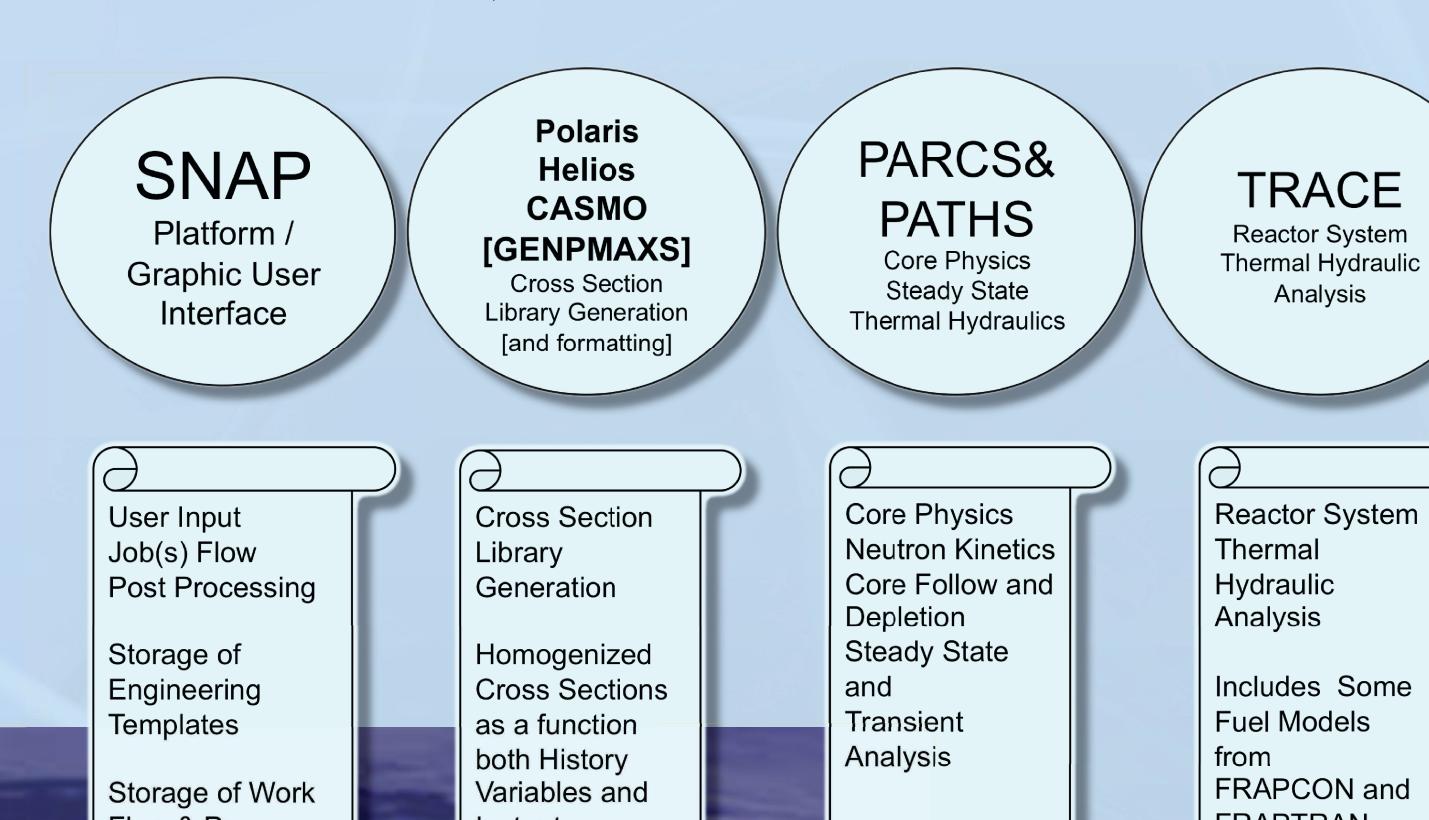
How do Members benefit?

- Programs have provided a venue for members to develop and share knowledge about thermal-hydraulic safety analysis. The user community and the quality of the analysis codes benefit through the network effect of CAMP.
- Examples include:
- -Visualizing and understanding complex plant transients
 -Applying the codes to plant safety analyses
- -Applying the code to analyses outside NRC assessment base

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How does NRC benefit?

- Member contributions have saved NRC resources and improved the codes. The larger user community and range of applications help to identify code problems and improved modeling approaches.
- Examples include:
- Identifying code errors
- Plant modeling for new applications
- "In-Kind" contributions, NUREG/IAs



Cooperative Severe Accident Research Program (CSARP)

What is CSARP?

- International program on severe accident phenomenological research and code development activities
- NRC coordinated program with participation from 27 countries
- Limited experimental programs sponsored by NRC
- Current thrust on development, assessment and application of severe accident systemlevel code MELCOR
- NRC hosts a meeting once a year (in September) to exchange progress in severe accident research and to report code development and assessment status

How does NRC benefit?

- Access to experimental data for code development, modification and assessment, e.g.,
- MOX and high burnup fuel fission product release experiments (IRSN, France)
- QUENCH experiments investigating overheated fuel (KIT, Germany)
 OECD MCCI (debris coolability, ANL, USA)
- Validated codes used for regulatory applications, e.g.,
- Design certification for new reactors
- Revised source term for HBU/MOX in PWRs
- State-of-the-Art Reactor Consequence Analysis (SOARCA)
- Spent Fuel Pool Study (SFPS) and the closely-related Japan Lessons Learned Tier 3 item to consider expedited transfer of spent fuel to dry cask storage
- Analysis of the event at Fukushima, and to support the Japan Lessons Learned
 Directorate and Near Term Task Force (NTTF) recommendations
- Technical support for the full scope site Level 3 Probabilistic Risk Assessment
- Assessment of code models
- MELCOR Code Assessment Program [MCAP] technical review meeting
- Code application by members
- Model development contributions and suggestions (air oxidation, PSI, Switzerland)

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Radiation Protection Code Analysis and Maintenance Program (New Initiative**)



RASCA

The Radiological Assessment Systems for Consequence Analysis (RASCAL) computer code evaluates releases from nuclear power plants, spent fuel storage pools and casks, fuel cycle facilities, and radioactive material handling facilities and is designed for use by the NRC in the independent assessment of dose projections during response to radiological emergencies.

RADTRAD

The RADTRAD computer code is used to assess occupational radiation exposures, typically in the control room; to estimate site boundary doses; and to estimate dose attenuation due to modification of a facility or accident sequence.

HABIT

The HABIT computer code is an integrated set of computer programs used to estimate chemical exposures that personnel in the control room of a nuclear facility would be exposed to in the event of an accidental release of toxic chemicals.

VARSKIN

The VARSKIN computer code uses a library of decay data for a large number of radionuclides, and also a set of built-in source geometries, to calculate the dose to the skin resulting from contamination on the surface of the skin or on protective clothing.

PIMA

The Phantom with Moving Arms and Legs (PIMAL) humanoid phantom models are considered an efficient and accurate tool for developing exposure models and performing dosimetry calculations for radiation workers and exposed members of the public.

RAD Toolbox

The Radiological Toolbox is an electronic handbook that contains extensive databases related to radiation work. The software does not perform any calculations beyond unit conversions and minor radioactive decay and equilibrium calculations.

** Currently developing Domestic Partnerships and International Agreements

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